

Beneficial Plants Attract Natural Enemies of Pests in Newly Replanted Oil Palm Plantations

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ABSTRACT

The oil palm industry in Indonesia and Malaysia rapidly expanded between 1987-1993, with palm oil production increasing by 61%. As the oil palm plantation lifecycle is 25-30 years, this land is now being replanted. The long lifecycle of oil palm enables a complex ecosystem to develop, but little is known about how replanting with young oil palm affects this ecosystem. One of the corner stones of sustainable palm oil production is Integrated Pest Management, where an accepted level of pest species are tolerated and controlled by naturally occurring predators. Pesticide application is only used when the abundance of pest species crosses an economic damage threshold. This method is especially useful for control of lepidopteran defoliators in mature oil palm, where nectar-providing beneficial plants are established to attract wasps, which are natural enemies of immature lepidopterans.

In this study we investigate how oil palm replanting affects the understory insect community, in particular pest insects and their natural enemies. Additionally, we experimentally test whether planting beneficial plants increases insect abundance in the newly replanted oil palm landscape. Research was based in oil palm plantations in Riau province, Sumatra, Indonesia. Data was collected at identical locations at three time intervals: 1) Immediately before clear-cutting, 2) Three months after replanting, and 3) Eight months after replanting. Beneficial plants were established inside the plantation blocks immediately after replanting at half of the sites. Insects were collected using pan- and pitfall-traps and the number of insects visiting flowers at each site was recorded as well as ground cover at trapping sites.

Over the replanting period habitat structure changed from closed canopy to no canopy cover with less fern cover and more herbaceous plant cover. Furthermore, number of flowers/m² was highest at beneficial plant sites. We found highest abundances of insects eight months after replanting, with more insects visiting flowers at beneficial plant sites. Most insect orders increased in abundance from mature to newly replanted oil palm, including Hymenoptera and Diptera, which are known predators and parasitoids on lepidopterans and orthopterans. Moreover we found no marked change in lepidopterans and orthopterans abundance.

Our results show that replacing natural understory plants with beneficial plants increases the number of flowers, with potential benefits for nectar-demanding parasitoid species. This, combined with the increase in insect abundance, indicates that nectar-resources are a key component in driving insect abundance, as supported by other studies. Most importantly, the general increase in insect abundance is not reflected in the numbers of lepidopterans or orthopterans, the key herbivorous pest groups, indicating that herbivory levels will not

increase in these replanted sites. Therefore, this study suggests that incorporating beneficial plants in all stages of the oil palm life cycle is a valuable tool for Integrated Pest Management in plantations and may be important in developing more-sustainable palm oil production.